Effect of mid connection detail on the behavior of offcentre bracing system (OBS)

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Abstract

An offcentre bracing system that is used as a lateral-load resisting system consists basically of the non straight tension strut with an eccentricity. The mid-point is connected to the corner by the third member. In this paper, 3D finite element models using ABAQUS software have been prepared for one span and one story offcentre braced frames. Then, a proposed mid-connection detail is compared with the commonly used one. The results indicate that the proposed mid-connection detail can improve both of the strength and ductility of offcentre braced system. Furthermore, the push-over analysis show that the response modification factor and strength of braced system with suggested mid connection detail are more than those of the system with common mid connection detail

Keywords: **Offcentre bracing system, Mid-connection, Finite element, Response modification factor.**

1. INTRODUCTION

Steel offcentre braced system (OBS) is one of the load resisting system, Especially for first story of building structures and entrance span of parking.The Steel braces improve the lateral stiffness and strength of the stractural system and frames and participate in seismic energy dissipation by deforming inelastically during an earthquake. The inelastic behavior of an offcentre bracing system under service cyclic loading has not been well established yet. In offcentre bracing system that consists of three diagonal members in each side of span, behavior is complex .

In earlier reports [1-2], offcentre bracing was introduced as an alternative efficient expedient to enhance the seismic performance of framed structures. As will be shown later, offcentre bracing systems are capable of producing a certain amount of seismic isolation action as well as energy dissipation, the former emerges from the geometrical nonlinearity and the latter relies on the material nonlinearity of such systems. This paper presents a brief introduction of the offcentre bracings, and the results of investigation into their cyclic and dynamic behavior in both nonlinear elastic and nonlinear inelastic ranges.

In this paper a particular bracing system will be introduced. This system will be referred to as off-centre system hereafter, it is illustrated in Figure 1. The strut AOB is not a straight member, and it has an eccentricity designated as e. The mid-point O is connected to the corner by the third member OC.

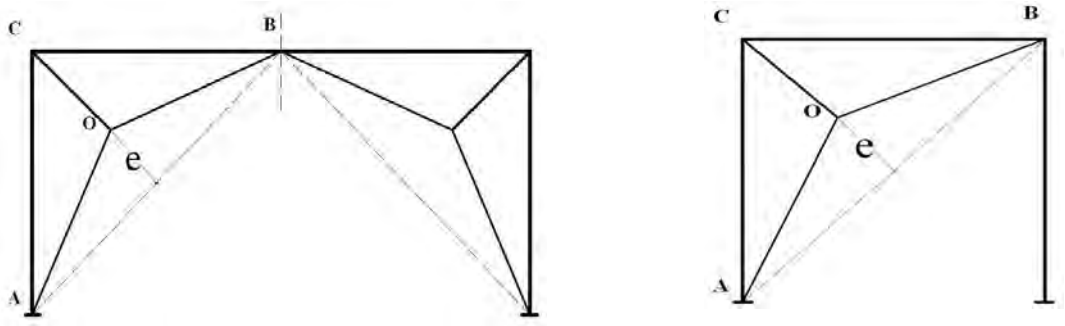

Figure 1. Offcentre bracing frame